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ABSTRACT

In recent years, interest in teamwork in the workplace has increased noticeably. For technical educators, the implications of this emphasis on employee involvement and cooperation are clear: they should begin developing the requisite skills in their students before they enter the work force. The skill sets that are needed--in effective communications, leadership, and decision making--can be effectively developed in the context of current courses. Once the decision for cooperative learning has been made, a series of practical issues must be dealt with--figuring out how to restructure classroom activities to conform with this general ideal. The practical decisions about restructuring a course can be greatly aided by conversations with colleagues. The handful of published guidelines for implementing collaborative techniques in the college classroom includes the following: a special issue on higher education of "Cooperative Learning" magazine; a volume by Johnson, Johnson, and Smith (1991) that is a source of practical ideas; and a "how-to" volume on cooperative learning published by the National Center for Postsecondary Teaching, Learning, and Assessment. The next step is to work on the syllabus--what needs to be changed, the amount of material that can be covered, and what kinds of activities groups will be working on. (Contains 12 references.) (YLB)

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TEAMWORK AND COOPERATIVE LEARNING IN TECHNICAL EDUCATION

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Introduction

Recent years have seen a great surge of interest in (and utilization of) work teams and other group management techniques in business and industry. This emphasis on teamwork has important educational implications. Employees need training in various social skills to work effectively in groups. And it is important that this training be integrated into programs of technical education. Cooperative learning provides a highly relevant model on how this might be accomplished. Students who have learned to cooperate on classroom tasks will be better prepared to cope with employer demands for teamwork. That is the promise of cooperative learning. On the practical side, the challenge for technical educators is to identify -- and effectively implement -- the appropriate cooperative techniques for their own classrooms. What works well in one setting may or may not work well in another classroom. Unfortunately, the practical literature on cooperative learning is not extensively developed, especially for higher education. There are some valuable sources, but this is an area in which we need to develop a more solid base of knowledge.

Background: On Teamwork and Cooperative Learning

The growing use of teamwork is part of the on-going reorganization of workplace relationships. Managerial theorists have for years been touting the value of employee participation and teamwork over traditional top-down control structures. And, increasingly, their ideas have been put into practice. In a recent analysis of a group of national surveys of workplace reform, Appelbaum and Batt (1994, p. 68) concluded that from one-quarter to one-third of U.S. firms have made "significant changes" in workplace management practices (towards a participative model) -- and that the pace of change "has accelerated and is occurring even faster than anticipated." Evidence

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from an annual corporate survey by *Training* magazine shows that teamwork has become an increasingly common practice; its 1995 survey found that 78 percent of U.S. organizations had some employees working on teams. Teams exercising "self-management" responsiblities are less common, but they do occur in about a third of the corporations -- and, states the magazine, "more self-managing teams than ever are taking on tasks formerly the purview of supervisors or managers" (*Training*, 1995, p. 72).

With the rapid growth of teamwork (and expanded managerial responsiblities of teams), there has been a noticeable increase of employer concern about teamwork training and education. In its 1995 survey, *Training* found that 70 percent of its corporate respondents were providing some form of "team building" training. Much of the education in teamwork techniques is done by corporate trainers, but there is also an army of management consultants now offering workshops and short courses in teamwork techniques. For technical educators, the implications of this emphasis on employee involvement and cooperation is quite clear: we should begin developing the requisite skills in our students *before* they enter the workforce. The skill sets that are needed -- in effective communications, leadership, decision-making and other group processes -- can be effectively developed in the context of our current courses. What we need to adopt in our classroom work is the methodology of cooperative learning.

As envisioned by the Johnsons (1994), Slavin (1990) and other educators, cooperative learning involves students working together in small groups on curricular tasks. The key factor is the social interdependence of the students and its effects on their interest, motivation, achievement and social relations. Extensive research (in both laboratory settings and real-life classrooms) has shown that students working in cooperative groups typically achieve higher levels of subject matter learning *and* more effective communications and other group process skills. The latter of course is the key finding for teamwork training. The development of social skills in group work -- learning to cooperate -- is the key to effective teamwork.

Cooperative learning has been a viable movement in elementary and secondary schools for almost two decades. Future teachers are exposed to cooperative learning ideas in their textbooks and coursework at many education colleges. And publishers like Scholastic Books have put out practical guidebooks (Ellis and Whalen, 1990) on how to implement the methodology. Cooperative learning has had less impact in higher education, especially at four-year schools, which have long ignored questions about teaching effectiveness. But the situation may be changing. *Cooperative Learning* magazine has reported on a variety of experiments with cooperative techniques, from the engineering school at the University of Minnesota where all new instructors receive mentoring in cooperative learning to a number of prominent medical and nursing schools. And, at conferences such as this one, one hears more firsthand accounts about cooperative learning than in past years.

Implementing Cooperative Learning

The decision to adopt cooperative learning techniques can be motivated by a number of factors. Perhaps you've been impressed by something you read about the theory and research on cooperative learning. Or maybe you have a colleague who uses the technique. Perhaps you experienced cooperative learning as a student. Or maybe you just like the idea of promoting teamwork. Whatever the reason, once the basic decision for cooperative learning has been made, you have to deal with a series of practical issues -- figuring out how to restructure your classroom activities to conform with this general ideal. And this, as Smith and MacGregor (1992, p 18) note, can be quite challenging: "Collaborative learning situations require a demanding yet important rethinking of one's syllabus, in terms of course content and time allocation.... Teaching in collaborative situations puts the tension between the process of student learning and course coverage front and center."

The practical decisions about restructuring a course can be greatly aided by conversations with colleagues. Most campuses now have a few "early innovators" who have been working with collaborative techniques for a number of years. It is essential that they be consulted, even if they teach in a field quite different from your own, because some group techniques are very widely applicable. This was brought home to me in a conversation with a colleague at our school's Dept. of Curriculum and Instruction, who noted that she uses the same technique of focused group discussion in her undergraduate classes as she used to use in teaching middle school students. Also, in talking with colleagues, I have found that not everyone calls their experiences with group techniques "cooperative learning." Whatever they call it, if it fits the model of group-based learning, one should pay attention to what they have to say about their experiences.

There are only a handful of published guidelines for implementing collaborative techniques in the college classroom. *Cooperative Learning* magazine put out a special issue on higher education a couple of years ago which has some useful anecdotal information. By far the most comprehensive source of practical ideas is a volume by Johnson, Johnson and Smith (1991). It covers the different types of groups, appropriate group size, need to limit lecture time, importance of paired informal discussions, exam techniques and even includes a sample course syllabus. All of these ideas and suggestions are explained in detail, with much attention to the underlying theories of positive interdependence and personal accountability. Although the Johnsons have been very extensive researchers on coooperative learning, this volume contains no references to their research -- and its list of practical suggestions is presented basically as "expert opinion." Another useful "how to" volume on cooperative learning was published by the National Center for Postsecondary Teaching, Learning and Assessment (Goodsell, Maher and Tinto, 1992). The articles here are based in part on research into effectiveness of different collaborative techniques, and offer various guidelines for group selection, class activities, teacher roles and grading practices.

When the novice finally decides to take the plunge, and implement what he or she has learned from colleagues and the "how to" volumes, the first area of work will be the course syllabus. What needs to be changed? Can you cover all of the material you normally cover during a semester? Perhaps you can, but certainly not in the same way. If you are going to use student groups, you will have to allow class time for group work. And that means you will not have as much time for lecturing. In restructuring your syllabus, you have to think about what kinds of activities your groups will be working on. If you deal with conceptual or factual material, as I do in a labor relations course, you might want to give your groups case studies to work up. But if you deal with problem-solving skills, as I do in my statistics and quality control courses, you would want them to focus their group work on problems. Then there is the issue of quizzes and exams. If you follow the Johnsons' suggestion, and have students take exams twice -- first individually and then as a group -- that will take up more class time. As you rewrite your syllabus, and make decisions about group activities for your students, you will probably also give some thought to the so called "free rider" problem. How should you deal with the few slackers that are present in most classrooms? A method suggested by a number of writers is to include a peer evaluation in your grading system. By the time your have finished your syllabus, you have conducted a lengthy "thought experiment" on what you expect to happen in your first semester of cooperative learning.

As the novice moves through the day-to-day routine of his/her first semester of cooperative learning, there will be some very memorable days. Such as the first time you pose a question midway through a lecture, tell the students to pair up with a neighbor and discuss the question, and they do truly discuss it -- in a way you had never seen in your many efforts at "whole class" discussions. And then that day in another class, one dealing with problem-solving skills, where you notice the sense of mastery (and confidence) students demonstrate as they explain solutions to each other. With the students sitting together in groups, you find yourself learning their names much sooner than your normally do. As the semester unfolds, there are the inevitable problems -- groups not working as effectively as they might, people getting angry with one another, and some grumbling about not having enough class time for group work. The problems get resolved, sometimes not as effectively as you might wish. But, no matter, you are engaged in something new and it seems to be working. Students seem to be learning more, and enjoying the experience. And you are beginning to remember all the reasons why you originally got into teaching.

In Conclusion: Some Thoughts About Research and Networking

We currently know very little about the general use of cooperative learning in technical education. There is an increasing use of terminology about teamwork in some areas, such as computer programming, but that may or may not be indicative of a real use of collaborative techniques. A survey of current classroom practices in technical education would tell us just how well we are preparing our students for the

new team-based workplace. Beyond the matter of getting a general fix on what we are doing, we need to know in a more detailed manner what works -- and doesn't work -- in cooperative learning in technical education. Those of us who have implemented group techniques have some individual views, but we need to get some answers from across the board. And, again, that means research.

Research data I will be gathering over the next few months should provide a reasonably accurate picture of what is going on in technical education. A twopart survey will be conducted -- one of all the faculty in technical education positions at SIU @ Carbondale and another of a sample of the higher education membership of the AVA. Questions in this survey will deal with views and experiences of group teaching techniques, with special attention being paid to various issues faced by those using these techniques. Hopefully this research will generate interest in establishing some kind of support network among those involved in cooperative learning. We need to use these techniques more effectively.

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